BIRD

INSTRUCTION book

MODEL 8141

Instruction Manual
for
Model 8141 TERMALINE®

Coaxial Load Resistor

Bird Electronic Corp.
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Cleveland (Solon), Ohio 44139

8141-127 Rev.180

SUMMARY

SPECIFICATIONS

Frequency Range	DC to 2500 MHz
VSWR	1.1:1 max dc to 1000 MHz 1.2:1 max. to 2500 MHz
Input Impedance	50 ohms nominal
Load Power Rating	250 watts continuous
Ambient Temperature Range	-40°C to +45°C
Weight	10 pounds (4.54 kg)
Overall Dimensions	9-9/16"lg x 5-15/16"w x 8-1/2"h (243mm x 151mm x 216mm)
Operating Position	Horizontal only

SECTION 1

GENERAL DESCRIPTION

1-1. General

The Bird Model 8141 TERMALINE Load Resistor is a portable, general purpose 50-ohm coaxial transmission line termination. It is a self-contained unit requiring no outside power source or additional equipment. The Model 8141 TERMALINE Coaxial Load provides an accurate, dependable, and practically non-reflective termination for adjustment, standby, and testing of transmitters under non-radiating conditions from dc to 2500 MHz.

The Model 8141 is rectangular in shape with transverse cooling fins spaced evenly along its entire length. Its short length makes it particularly useful in locations where the length of Models 8401 or 8201 would not be easy to place. Also, the 10 pounds total weight is a convenience in portable use. Mounting holes are provided. See Section 2, Installation.

The RF input connector, located on the front face of the unit, is a Female N similar to UG-58A/U, but is a patented "Quick-Change" design permitting rapid and easy interchange with other AN type connectors.

1-2. Theory of Operation

The Model 8141 TERMALINE Load consists essentially of a cylindrical film type resistor immersed in a dielectric coolant. The resistor, individually selected for its accuracy, is enclosed in a special tapered housing which provides a linear reduction in surge impedance directly proportional to the distance along the

resistor. This produces the uniform, practically reflectionless line termination over the stated frequencies of the load.

The dielectric coolant is chosen for its desirable electrical properties and thermal characteristics. Cooling of the Load is accomplished by natural fluid and air convection. The dielectric coolant carries the electrically generated heat from the resistor to the walls of the cylindrical cooling tank. The tank is encased in a set of heavy gauge metal radiating fins, which are firmly pressed on the cylinder. The heat from the dielectric oil is transferred to the surrounding air by the radiating fins.

A synthetic rubber diaphragm located in the rear dome of the Load allows the coolant to expand as the temperature rises.

SECTION 2

INSTALLATION

Locate the Model 8141 TERMALINE Load Resistor to provide at least six inches of free space around and above the unit. Place the Load to permit the shortest possible cable length between the unit and the transmitting equipment.

Operate the Model 8141 in a horizontal position only, with the handle on top. The Load may be free-standing on any convenient flat surface. The front and rear fins are made extra thick and bent outward 90° to form mounting flanges. Fasten the Model 8141 by its mounting brackets with 1/4" machine screws and nuts or #12 wood screws if desired. The four 9/32" holes in the mounting brackets form a base rectangle of 7-15/32 by 5-1/8 inches, (189.7mm x 130.2mm).

SECTION 3

OPERATION

Connect the Model 8141 TERMALINE Load to the transmitting equipment under test with 50-ohm coaxial cable such as RG-213/U or equal, and a Male N Type plug (UG-21E/U or equal) which mates with the RF input connector of the Load. After the transmitter has been connected to the Load, proceed according to the transmitter manufacturer's instruction.

Due to the difference in VSWR between the Dummy Load and the transmitter's antenna, re-adjustment of the transmitter may be required when returning to the original antenna.

CAUTION

DO NOT operate this equipment over the rated 250 watts continuously.

The unit will sustain an intermittent input of 300 W max. for up to 10 min. with 1/2 hour off between power applications.

SECTION 4

TROUBLESHOOTING

4-1. Periodic Inspection

With the rugged and simple construction of the Model 8141 TERMALINE Load, periodic inspection will be necessary at only about six-month intervals. Inspection should include the items listed below:

a. Oil Leakage. Check for coolant oil seepage from the radiator tank, and particularly at the front and rear near the under side of the clamping band. See paragraph 4-2, Trouble-shooting Chart if leakage is observed. Check tightness of the clamping screw.

b. DC Resistance. Check the condition of the load resistor by accurate measurement of the dc resistance between the inner and outer conductors of the RF input connector. Use a resistance bridge with an accuracy of one percent or better at 50 ohms (such as the Leeds & Northrup 5305 Test Set). The measured resistance should be a nominal 50 ohms, ±2 ohms.

c. Inspect the Model 8141 TERMALINE for completeness and general condition of the equipment.

4-2. Troubleshooting Chart

The troubleshooting chart on the following page lists the symptoms of commonly encountered troubles, causes, and suggested corrective measures. Use this chart as a guide when analyzing symptoms.

Symptoms	Causes	Remedy
Leakage of coolant oil around clamping band or radiator housing.	Clamping bands not tight.	Tighten slightly with a screwdriver.
	Faulty O-ring (front).	Replace per paragraph 5-2c.
	Faulty diaphragm (rear).	Replace per paragraph 5-2b.
Excessive overheating of the radiator.	Transmitter power too high.	Reduce transmitter power.
	Coolant oil level too low.	Add more coolant oil to the radiator per paragraph 5-2b.
	Faulty RF Section Assy.	Replace per paragraph 5-2c.
High or low dc resistance values per par. 4-1b.	Faulty RF input connector.	Replace per paragraph 5-2a.
	Loose RF input connector.	Tighten with a screwdriver.
	Faulty RF Section Assembly.	Replace per paragraph 5-2c.
	Coolant oil level too low.	Add more coolant oil to the radiator per paragraph 5-2b.

SECTION 5

MAINTENANCE

5-1. Operator's Maintenance

The Model 8141 is rugged and simple, requiring only nominal routine care. It is designed to operate for long periods of time, if care is taken not to exceed its power handling capabilities.

The outside surface of the instrument should be wiped free of dust and dirt when necessary. Clean the RF input connector with Inhibisol or its equivalent, or trichlorethylene on a cotton swab stick. Take special care to clean the metallic contact surface and exposed face of the teflon insulator. Provide adequate ventilation and observe normal precaution when using solvents.

If any portions of the radiator are corroded or rusted, clean the area with a fine flint sandpaper, and touch up with gray enamel.

5-2. Repairs

There are no special techniques required for the repair or replacement of components in the Model 8141 TERMALINE Load. A screwdriver is the only tool needed. The paragraphs below outline component removal.

a. RF Input Connector Replacement. The input connector is a patented "Quick-Change" design which permits easy interchange with the use of only a screwdriver. This process does not interfere with the essential coaxial continuity of the load resistor RF input or the coolant oil seal. For replacement, proceed as follows:

(1) Remove the four #8-32 x 5/16" round head machine screws from the corners of the RF connector.

(2) Pull the connector straight out of its socket.

(3) Reverse the above procedure to install new connector. Be sure that the projecting center contact pin on the connector is carefully engaged and properly seated with the mating socket of the load resistor input.

The "QC" connector may be readily replaced, as above, with other AN Types. Some applicable connector types available are: -

Female N	424062	Female HN	424268	Female BNC	424125
Male N	424063	Male HN	424278	Male BNC	424132
Female C	424100	Female LC	424031	Female UHF	424050
Male C	424110	Male LC	424025	Male UHF	424179

b. Diaphragm and Coolant Oil. To examine the diaphragm and coolant oil, remove cover. Proceed as below.

(1) Stand the Load vertically, with the back end up.

(2) Loosen the clamp screw to release the clamping band.

(3) Remove the diaphragm cover and lift the diaphragm from the back end of the radiator tank.

(4) The coolant level should be about one inch below top of the cylinder. If oil appears contaminated, replace. Use only specified coolant, Bird P/N 5-1070.

(5) To reassemble, reverse the above procedure.

c. RF Load Resistor Assembly. To replace the load resistor assembly proceed with the steps below.

(1) Stand the radiator vertically with RF input connector up.

(2) With screw driver loosen the #10-32 clamping screw on clamp band holding RF Section mount enough to remove the band.

(3) Lift the Load Resistor straight up and out of the Radiator tank. Hold for a short time over tank to allow oil to drain back in.

(4) Inspect the O-ring seal just inside the sloped flange of the mounting ring. Replace this seal, Bird P/N 5-230, if it shows any evidence of cuts or deterioration.

(5) To replace the Assembly, reverse the above procedure.

TABLE 5-1. REPLACEMENT PARTS LIST

NAME AND DESCRIPTION	LOCATING FUNCTION
RADIATOR, Cooling: Rectangular shape 8-13/16 lg x 5-15/16 w x 8-1/2 h Transverse vertical fins at 5/8 intervals to central tank. Al. alloy, Gray enamel, Bird p/n 2440-015.	Houses RF load resistor and dielectric coolant.
RF SECTION ASSY: Tapered and slotted coaxial line with 50 ohm load resistor center conductor. 4-1/2 dia x 6-3/16 lg. Aluminum alloy. Bird p/n 8141-002.	Housed in radiator, non-reflecting terminator for RF Power.
COOLANT: Hi-temperature dielectric oil. Bird p/n 5-1070.	Contained in radiator. 0.35 gal (1.3 liter)
CONNECTOR, RF INPUT: Female Type N 47/64 lg with 1-1/4 square mounting flange. Four 3/16 mounting holes on 15/16 square. 5/8-24 thread. Brass, nickel plate. Bird p/n 4240-062.	Female N RF input connector on front face of unit.
CLAMP BAND: 4-5/8 OD x 1/4 V-band with two clamping blocks (one threaded) and 10-32 x 1-1/2 Fil. HMS. Stainless steel, gray nickel plate. Bird p/n 2430-055 (2).	(1) Holds RF Section to radiator. (1) Holds Diaphragm to radiator.
O-RING Seal: 4 x 1/8 nominal. Synthetic rubber. Bird p/n 5-230.	Seal for coolant oil.
DIAPHRAGM: 4-3/8 x 1-1/2 nominal. Synthetic rubber. Bird p/n 2430-015.	Expansion bellows for oil.
COVER, DIAPHRAGM: 4-7/16 x 25/32 nominal. Bird p/n 2430-148.	Protective cover for diaphragm.

QUALITY INSTRUMENTS FOR RF POWER MEASUREMENT

From 2 to 2300 MHz and from 25 milliwatts to 250 kilowatts in 50-ohm coaxial line systems.

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